

# Sunnyside Gold Corporation

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September 4, 2015

Ms. Paula Schmittdiei  
U.S. EPA Region 8  
595 Wynkoop St.  
Denver, CO 80202-1129

## RE: Revised Work Plans and Quality Assurance Project Plans (QAPPS)

Dear Paula:

Thank you for providing EPA's June 27, 2015 comments on the following Work Plans/QAPPS:

- Draft Subsurface Investigation Work Plan – Mayflower Mill and Tailings Impoundments Area, and
- Draft Surface Water, Groundwater, and Solid-Phase Media Investigation Work Plan – Mayflower Mill and Tailings Impoundments Area.

As you will recall, representatives of EPA and Sunnyside Gold Corporation (Sunnyside) discussed these comments during a conference call on July 31, 2015. On August 19, 2015, Sunnyside provided redlined versions of the Work Plans/QAPPS, with corresponding Crosswalk documents, which addressed EPA's comments. These revised documents were discussed by EPA and Sunnyside representatives during an August 26, 2015 conference call. Following that call, additional requested information was provided (i.e., revised Standard Operating Procedures [SOPs]) and, on August 27, 2015, the EPA indicated by email that the revisions adequately addressed all of EPA's comments.

Enclosed, for your files, are complete revised versions of the two Work Plans/QAPPS with all appendices and Crosswalks. All of the redline markings reflected in the August 19, 2015 versions have been accepted in the enclosed Work Plans/QAPPS. Responses to EPA's comments on each Work Plan/QAPP are attached to this letter. Finally, a distribution list and approval page have been included behind the title page for each of the Work Plan/QAPPS.

Sunnyside values the technical input provided by EPA and the support agencies in connection with this project. We look forward to continuing our cooperative approach with respect to

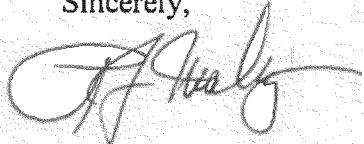
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the investigation and assessment of water quality in the upper Animas River basin. In the meantime, please contact me with any questions regarding the enclosed Work Plans/QAPPs.

Sincerely,



Pat Maley

Director, Environment

Sunnyside Gold Corporation

Enclosures

cc: See distribution lists

**EPA Comments on**  
**SUBSURFACE INVESTIGATION WORK PLAN for**  
**MAYFLOWER MILL & TAILINGS IMPOUNDMENTS AREA**

EPA has reviewed the "Subsurface Investigation Work Plan for the Mayflower Mill and Tailings Impoundment Area" submitted by Sunnyside Gold Corporation ("Sunnyside") on July 14, 2015. At the same time, Sunnyside submitted a separate work plan for "Surface Water, Groundwater and Solid Phase Media Investigation Work Plan of the Mayflower Mill and Tailings Impoundment Area." While Sunnyside submitted them as separate work plans they are related.

1. In reading the work plan it is not clear from the plan how the data collected under this work plan will be used. If a water bearing or bacterial community is identified, how will this information be used in decision making or to guide further data collection activities.

**Response:** *The following excerpted text was added in Section 1.0 of the work plan in response to this comment:*

*"The purpose of the subsurface investigation is to characterize the textural characteristics, moisture characteristics, and metals concentrations in the tailings. In addition, microbial populations at selected locations will be initially characterized for assessment of their ability to affect metals mobility and for future biotreatment alternatives, as described in Section 3.2. All of the information collected as part of this subsurface investigation will be used as part of an assessment of the extent to which the Mayflower Mill and Tailings Impoundments Area serves as a source of metals to the Animas River."*

2. The work plan also states that the groundwater wells will be sampled based on the results of the subsurface investigation, but the work plan does not discuss how the wells will be selected for sampling.

**Response:** *The following excerpted text was added in Section 4.3 of the work plan in response to this comment:*

*"All new wells completed during the drilling program will be sampled. Additional existing wells may be sampled, as needed. At a minimum, groundwater samples will be collected before and during spring run-off to evaluate seasonal changes in groundwater quality. Routine quarterly groundwater monitoring, except during the winter quarter, will likely be conducted thereafter for at least one year. Groundwater sampling and water level measurements are described in detail in a separate multi-media work plan (Formation Environmental, 2015a)."*

3. Sunnyside included a Quality Assurance Project Plan/Sampling and Analysis Plan (QAPP) as an appendix to for the work described in each work plan but did not submit a Crosswalk for either QAPP. EPA requires the preparer of the QAPP to submit a Crosswalk to aid in its review of a QAPP. Since Sunnyside did not submit a Crosswalk, EPA as part of review has completed the Crosswalk and provided its comments concerning the QAPP the Crosswalk. It is requested that Sunnyside provided an explanation for how it addressed each deficient

item noted in the Crosswalk including the comments in the “Summary of Comments” and re-submit the Crosswalk when it resubmits the revised work plan including the QAPP. The “Response” date and “Resolved” date should be included in the Comments section of the Crosswalk.

**Response:** Please refer to the submitted Crosswalk table, which includes resolutions to the various issues identified by EPA reviewers.

4. Significant concerns with the QAPP include the following items:

- All SOPs including Laboratory, Sampling Disposal (SOP3) and the Laboratory QMP need to be included as appendices to the QAPP.
- A timeline of activities should be provided.
- Information on indirect measurements should be included.
- Signature lines for EPA’s approval (if we enter into an AOC) as well as Sunnyside approval, distribution list, DCN (document control number) and Revision number were also missing.

**Response:**

- SOPs have been attached to the QAPP as Attachment A-1.
- A schedule was included in Section 4.5 of the Work Plan.
- Indirect (non-direct) measurements were discussed in Section 3.7 of the QAPP
- An approval page has been prepared and included with the QAPP.

Additional comments on the overall work plan are as follows:

5. **Page 2-1, Section 2.0 Background** – Please provide more discussion on the types of materials besides tailings that were disposed of in the tailings impoundments and their likely location. Were the locations for disposal of these other materials documented?

**Response:** The following excerpted text was added to Section 2.0 of the Work Plan in response to this comment:

*“In addition to tailings storage, the impoundments were used for disposal of other materials. Knowledge of the presence of these materials is presently only from verbal accounts and include municipal waste, American Tunnel mine waste, wastewater sludge, and transfer station materials. The volume of these materials disposed of in the tailings impoundments is unknown.”*

6. **Page 3-2, Section 3.2, last bullet**, “Would another question be whether microbial populations catalyze and increase metal mobility rather than limit metals migration?”

**Response:** The following excerpted text was revised/added to Section 3.2 of the Work Plan in response to this comment:

- “Are conditions in the impoundments suitable to support bacterial populations that may affect metals migration?

- Are microbial communities present in the tailings that may be utilized for future biotreatment?"

7. **Page 3-3, Section 3.4, DQO Step 4** – How would it be decided to expand the spatial boundaries of the study area, i.e., what criteria might be considered?

**Response:** Reference to expansion of the spatial boundaries for the 2015 subsurface investigation has been removed from the Work Plan. Expansion of the spatial boundaries will be considered during future investigations planned for 2016 and beyond. Additional investigations for 2016 and beyond will be described in a separate work plan(s).

8. **Page 3-3, Section 3.4, last paragraph,** “This temporal boundary limited to July - October 2015 may be too short to accomplish the data objectives. Although sample collection during field conditions prevailing during the summer-fall 2015 may be scientifically preferable, extending the sample collection into the 2016 field season should not be ruled out.”

**Response:** The following excerpted text was added to Section 3.4 of the Work Plan in response to this comment:

“Drilling will commence on August 5, 2015 and completion is anticipated by the end of August. It is anticipated that further work will be conducted beyond 2015; however, a new work plan will be developed for this work based upon results obtained from the 2015 field season.”

9. **Page 3-3, Section 3.5, first paragraph,** “How will sample design facilitate the collection of representative samples?”

**Response:** The following excerpted text was added to Section 3.5 of the Work Plan in response to this comment:

“This Work Plan describes the approach for initial subsurface characterization and as such it is difficult to predict if adequate representative samples will be taken. Based on the findings of the initial characterization, additional characterization may be warranted to achieve an adequate number of representative samples. However, great care has been taken in designing the preliminary sampling and analysis plan (SAP) to ensure that all data collected will meet stringent quality standards.”

10. **Page 4-0, Section 4.2 and Figure 4-1.** The locations of borings are limited to within the impoundment areas. Consideration should be given to placing borings outside the impoundment areas. This may be required to meet the DQOs listed in the SW, GW, and Solid Phase Media Investigation Work Plan. One of the DQOs suggests that upgradient water will be sampled and evaluated. See comment #4 on that WP.

**Response:** The following excerpted text was added to Section 4.2 of the Work Plan in response to this comment:

*"Two boreholes will be completed outside of the Tailings Impoundments Area at the Mayflower Mill (DH-16 and DH-17), four boreholes will be completed at TP-1 (DH-12 through DH-15), two boreholes will be completed at TP-2 (DH-10 and DH-11), one borehole will be completed at TP-3 (DH-9), and eight boreholes will be completed at TP-4 (DH-1 through DH-8). The selection of borehole locations took into account the engineered slopes for proper water drainage on the Tailings Impoundment Area and the steep relief on the northern edge of the impoundments. Due to safety issues, highly sloped areas will not be included in this Work Plan. However, the borehole sites were selected with the intent of surveying different grain size fractions, such as fine grained slimes and other coarse grained materials, while maintaining a safe distance from the crest of the slope. If the proposed locations are inaccessible with the drill rig, a nearby alternate location will be assigned or the location will be eliminated."*

*Refer to the comment response to Comment #4 on the multi-media work plan for a discussion of upgradient groundwater sampling.*

11. **Page 4-0, Section 4.1** – Please provide the other target analytes to be analyzed and discuss the reasons for analyzing them.

**Response:** *The following excerpted text was added to Section 4.2 of the Work Plan in response to this comment:*

*"These TAs include barium, cobalt, fluoride (soluble), lithium, molybdenum, silica, strontium, vanadium, acid-base accounting (ABA), net acid generation (NAG), and DNA extraction for molecular biology."*

12. **Page 4-0, Section 4.2,** "Can this plan estimate the expected total depth for these boreholes based upon the permitting or as-constructed tailings deposition records?" The Work Plan states that boreholes will be advanced to bedrock (if possible). The approximate depth of bedrock is likely known in the area. Likewise, a maximum depth will be imposed by the drilling subcontractor due to the availability of materials (casing, etc.). Therefore, EPA suggests that the Work Plan include more information on approximate and/or maximum depths of borings.

**Response:** *The following excerpted text was added to Section 4.2.1 of the Work Plan in response to this comment:*

*"Based on a comparison of the pre-tailings deposition land surface elevation and the current land surface elevation bedrock is anticipated occur at a maximum depth of 150 feet bgs; however, it should be noted that the bedrock elevation and tailings material thickness is variable across the tailings impoundments. As such, the total depth of the boreholes will be equal to the depth of competent bedrock or 180 feet bgs (maximum length of drill casing on-Site), whichever comes first."*

- 13. Page 4-1, Section 4.2.1.** The Work Plan states that the drilling waste will be disposed of on site near each borehole location. The impoundment is already capped and therefore nearby disposal may not be an appropriate method to dispose of waste. EPA suggests that waste management be reconsidered and further explained. See comment #5.

**Response:** *The following excerpted text was added to Section 4.2.1 of the Work Plan in response to this comment:*

*"Following the completion of the drilling program, all drilling waste will be permanently disposed of at Tailings Impoundment 4. At this impoundment there is a depression that collects water and requires regrading. As such, drilling waste will be used as backfill in this depression for regrading. The drilling waste will then be capped similar to the cap placed on the tailings during previous reclamation."*

- 14. Page 4-1, Section 4.2.2, second paragraph,** "Has the selection of borehole location been influenced by some consideration of the historical milling process? For example, do the borehole sites reflect a sampling of both the coarse sand-size fraction deposited near the tailings impoundments, as well as a representative sampling of the fine silty-clay size slimes from the historical froth flotation milling processes used during the operational history of this mill?"

**Response:** *The following excerpted text was added to Section 4.2.1 of the Work Plan in response to this comment:*

*"The tailings are expected to be generally finer-grained in areas distant from the outer embankments and closer to the native hillsides to the north given the method of tailings pond construction. In addition to tailings storage, the impoundments were used for disposal of other materials. Knowledge of the presence of these materials is presently only from verbal accounts and include municipal waste, American Tunnel mine waste, wastewater sludge, and transfer station materials. The volume of these materials disposed of in the tailings impoundments is unknown. The distribution of the planned boreholes was established while considering the potential differences in relative grain size and the potential presence of non-tailings materials."*

The Work Plan states that borings to complete as monitoring wells will be selected in the field. It would be helpful to have an estimated number of boreholes to be completed as monitoring wells. It would also be helpful to better understand the criteria that will be used to make the determination. For example, will at least one boring be completed per impoundment?

**Response:** *The following excerpted text was added to Section 4.2.4 of the Work Plan in response to this comment:*

*"It is planned for eight boreholes to be completed as monitoring wells; however, this number is likely to change according to field conditions. The basic criteria for completion includes saturated native alluvial materials with a thickness of 5 feet or greater. As such, the target zone for well completion is the native alluvial materials underlying each tailings*

*impoundment for the characterization of water quality and piezometric heads in the alluvial aquifer. It is assumed that the tailings materials are generally fined grained and therefore have a low permeability. However, permeable saturated zones in the tailings, if encountered, will be noted and further investigated with the installation of piezometers in 2016, as needed.”*

15. **Page 4-1, Section 4.2.2, second paragraph,** “Can this key reference be provided as an appendix to this plan? The technical article was published in the Proceedings for the Tailings and Mine Waste Conference, 1997, and it is difficult to find in most technical libraries.”

**Response:** *The publication has been provided as Appendix D to the Work Plan.*

16. **Page 4-2, Section 4.2.3** – Please explain the factors to decide which boreholes will be selected as monitoring wells. Also, please explain the factors considered in the selection of the borehole locations. On TP-1, the borehole locations all appear to be at the backside (mountain side) of the tailings impoundment – why not distributed across more of the tailings impoundment.

**Response:** *Please refer to the response to Comment #14.*

17. **Page 4-2, Section 4.2.4** – Please explain why monitoring wells will only be completed in native materials – is there a possibility that groundwater zones would be encountered within the tailings themselves that should be characterized?

**Response:** *Refer to the response to Comment # 14.*

18. **SOP No. 7, Section 1, paragraph 3.** The SOP references SOP No. 3 Storage and Disposal of Soil, Drilling Fluids, and Water Generated during field work. This SOP was not included in the work plan. Please include.

**Response:** *Reference to SOP has been removed from SOP No. 7. The following excerpted text was revised/added to Section 1 of SOP No. 7.*

*“Waste produced by decontamination procedures, including waste liquids, solids, etc., will be discharged to the land surface and will not be allowed to runoff into any water body.”*

19. **SOP No. 7.** This is the SOP for decontamination of equipment. It is also referenced in the drilling SOP. The decon SOP suggests that all equipment will be washed with laboratory grade detergent, rinsed, and possibly acid rinsed. Is this the procedure that will be used for drilling equipment (rig, casing, tools, etc.)? The drilling SOP mentions that a steam cleaner should be brought on site. It is more typical to use steam to clean drilling equipment. EPA suggests either adding a steam cleaning procedure to the decon SOP, or clarifying that drilling equipment will also be cleaned with soap and water.

**Response:** *The following excerpted text was revised/added to Section 1 of SOP No. 7.*

*"Decontamination is achieved primarily by rinsing with liquids which may include: steam, soap and/or detergent solutions, potable water, distilled weak acid solution, and/or methanol or other solvent."*

20. **SOP No. 8, Page 3.** The Work Plan states that the development water will be disposed of in a sediment basin located on the property. EPA requests additional details regarding the planned disposal of water that is likely impacted by Target Analytes. Additionally the SOP (No. 3) for Storage and Disposal of Soil, Drilling Fluids, and Water Generated during field work is not included.

**Response:** *The following excerpted text was revised/added to Section 1 of SOP No. 7.*

*"Water removed during well development will be discharged to the surface of the impoundments near each well head and will not be allowed to run-off the impoundment area."*

21. **SOP No. 12.** This SOP is a general drilling SOP. However, it does not include information about rotosonic drilling. As this is a rotosonic effort, EPA suggests revising the SOP to include discussion of the technique.

**Response:** *The following excerpted text was revised/added to Section 2.2.1 of SOP No. 12.*

*"Discussion of these drilling methods are given in "Standard Practice for Sonic Drilling for Site Characterization and the Installation of Subsurface Monitoring Devices" by American Society for Testing and Materials (ASTM) D6914-04 (ASTM, 2010); "Groundwater and Wells" by Driscoll, 1986; Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells" EPA, March 1991 (EPA/600/4-89/034); "RCRA Ground-Water Monitoring, Technical Guidance" EPA; and "Geoprobe Dual Tube Soil Sampling System" Geoprobe Systems."*

22. **SOP No. 12, Page 6.** The final paragraph on this page states that filter sand will be tremied to fill the annular space to about ten feet above the top of the screen interval. Then, 2 sentences later it states that the filter pack will be added to a minimum of 2 feet above the top of the screen to a maximum of 5 feet. These sentences appear to contradict each other. EPA suggests revising the SOP to clarify how filter pack sand will be placed. Furthermore, EPA notes that it is typical to place 1-2 feet of sand above the screened interval not 2-10 feet.

**Response:** *The following excerpted text provides clarification for how the filter pack will be placed. Contradictory text was removed.*

*"The filter pack will be added to a minimum of 2 feet above the top of the screen to a maximum of 5 feet."*

**EPA Comments on**  
**SURFACE WATER, GROUNDWATER, and SOLID PHASE MEDIA**  
**INVESTIGATION WORK PLAN for**  
**MAYFLOWER MILL & TAILINGS IMPOUNDMENTS AREA**

EPA has reviewed the "Surface Water, Groundwater and Solid Phase Media Investigation Work Plan of the Mayflower Mill and Tailings Impoundment Area" submitted by Sunnyside Gold Corporation ("Sunnyside") on July 14, 2015. At the same time, Sunnyside submitted a separate work plan for "Subsurface Investigation Work Plan for the Mayflower Mill and Tailings Impoundment Area." While Sunnyside submitted them as separate work plans they are related.

1. The SAP from a technical standpoint and generally speaking is vague and inconsistent in its objectives. The DQOs are not clear enough to determine a relationship between the goals, the data collection and data analytic approach. It is unclear as to what Sunnyside is trying to accomplish.

**Response:** DQOs have been revised as described in the comment responses below.

2. This work plan would be easier to follow and more complete if certain sections such as Background were provided in the work plan and not simply referenced in another document.

**Response:** The following excerpted text was added to Section 2.0 (Background) of the Work Plan in response to this comment:

*"The upper Animas River basin and its tributaries are intensely mineralized, and natural weathering of mineralized rock degrades the basin's surface water quality. Streams within the basin that are considered representative of natural-background conditions (i.e., unaffected or minimally affected by mining activity) can be acidic (pH < 3.0) with trace metals concentrations, including zinc, copper, and manganese, above aquatic life standards (Church and others, 2007). Environmental conditions in the upper Animas River basin also reflect influences from the extensive historic mining and milling activities that occurred over the past 150 years, including mining in areas upstream of the Mayflower Mill and Tailings Impoundments Area and on the left bank of the Animas River (the opposite bank from the Mayflower Mill and Tailings Impoundments Area). Mine adits and historic mine waste rock piles are present at numerous locations, and historic mills typically discharged tailings to the Animas and its tributaries. Additional background information is described in the Subsurface Investigation Work Plan (Formation Environmental, 2015a) and the High-Flow Surface Water Investigation Work Plan (Formation Environmental, 2015b)."*

3. **Section 3.1, 3<sup>rd</sup> sentence** - Please elaborate on what is uncertain regarding the effects on water quality in this area. The data suggests that the effects and potential effects on water quality are well documented and fairly unambiguous in this reach, but the specific sources, as you state, are what's uncertain.

**Response:** *The following excerpted text was added to Section 3.1 of the Work Plan in response to this comment:*

*"For example, it is unknown if the tailings materials in the impoundments are in direct hydraulic communication with the Animas River alluvial groundwater system and/or bedrock groundwater system and it is unknown how these groundwater systems interact with the Animas River."*

4. **Page 3-3, 4<sup>th</sup> bullet.** The DQO suggests that concentrations of TAs in groundwater upgradient of the Mayflower Mill and Tailings Impoundments area is needed. It is not clear if the work presented in this WP or the "Subsurface Investigation WP" will be sufficient to address this objective. No upgradient groundwater sampling appears planned.

**Response:** *The following excerpted text was added to the 4<sup>th</sup> bullet in Section 3.2 of the Work Plan in response to this comment:*

*"What are the concentrations of the TAs in groundwater at and upgradient from the Mayflower Mill and Tailings Impoundments Area based on data collected from existing upgradient piezometers and data collected from the monitoring wells proposed in the Subsurface Investigation Work Plan (Formation Environmental, 2015a)?"*

5. **Section 3.3**-Will the results of the geophysical investigation be used to help interpret this data? It seems relevant. If not, why not? And if so, how will it be incorporated into the analytical approach?

**Response 1:** *The following excerpted text was added as an information input to Section 3.3 of the Work Plan in response to this comment:*

*"Subsurface geophysical investigation data collected during the subsurface investigation (Formation Environmental, 2015a)."*

**Response 2:** *The following excerpted text was added to Section 3.5 of the Work Plan in response to this comment:*

*"Use geophysical investigation results from the proposed subsurface investigation (Formation Environmental, 2015a) to evaluate preferential groundwater flow pathways in the alluvial aquifer underlying the Mayflower Mill and Tailings Impoundment Area. Evaluation of these data will help support the interpretation of how surface water and groundwater interact."*

6. **Section 3.3-Table 4-1 and 4-2** indicate that water quality parameters will not be collected yet they are listed as necessary input here.

**Response:** *Field water quality parameters will be collected and are listed under the "Field Parameters" heading as a TA in Tables 4-1 and 4-2 of the Work Plan.*

7. **Section 3.3, 3<sup>rd</sup> sentence**-Please provide specifics on what SGC identifies as data gaps. It is difficult to understand the bigger investigation objective without understanding specifically what SGC considers a gap.

**Response:** *Refer to the comment response for Comment # 3.*

8. **Section 3.4 second paragraph** - It is not clear why the temporal boundary ends in 2015. The existing data strongly suggests a mechanism other than surficial runoff (ie GW) is a primary contributor to degraded water quality in the spring (pre-runoff) in the study reach. However well installation is not scheduled until summer/fall of 2015. How will the potential effects of GW on SW in the pre-runoff period of the hydrograph be determined with this sample design? If the wells are anticipated to be sampled as part of a longer-term monitoring program please indicate that.

**Response:** *The following excerpted text was added to Section 3.4 of the Work Plan in response to this comment:*

*"Additional multi-media sampling events are planned for 2016 and beyond and these investigation activities will be conducted under a separate work plan(s)."*

9. **Section 3.4** – How will it be decided to expand the spatial boundaries of study area? What criteria will be considered?

**Response:** *The spatial boundaries for the 2015 investigation will not be expanded. Discussion of the expansion of the investigation outside of the study area was removed from the Work Plan text. As noted in the response to the preceding comment, additional sampling outside of the current spatial boundaries will be described in separate work plan(s).*

10. **Section 3.5** - The analytic approach section stops short of indicating how the analysis will relate to the "Goals of the Study" in section 3.2, how comparisons will be made and what decisions will be made (if any).

For instance- bullet #2 in section 3.5 indicates that the SW data collected in this SAP will be compared to existing data. Presumably this is to address the 2nd and 3rd bullets in section 3.2; how do TA concentrations change across the study reach and how do the TA concentrations change relative to known inputs. If so, it is unclear why a comparison with historical data is warranted or useful. Is the real goal to determine if existing data is

representative of current conditions? Or is the goal to add an additional year's worth of data to existing data to evaluate time trends?

Another example-Bullet 5 indicates a comparison of GW and SW results will be done but it does not relate in any apparent way to the goals outlined in section 3.5. Clearly there is benefit in this comparison because, this is the suspected pathway of release into the river, however there is no study goal that indicates the need to determine the GW SW relationship.

Additionally, Sunnyside has only identified seeps on the right hand side of the river for sampling. In terms of understanding all of the sources on metal loading for this reach of the river, are there seeps on the left bank of the river that should be sampled?

Please provide concise description of how the analytical approach will achieve the stated study goals, or if appropriate modify the study goals to more accurately reflect the intent of the study. In addition, please provide more explanation of how measurement errors and related uncertainties for the data collected will be evaluated. Will statistical analysis be part of evaluating errors and uncertainties? If so, what statistical methods will be used?

***Response 1:*** *The following excerpted text was added to/revised in Section 3.5 of the Work Plan in response to this comment and the analytical approach below directly relates to the Goals in Section 3.2:*

*"The data analyses that will be performed as part of the multi-media investigation are as follows:*

1. *Compare the high-flow surface water monitoring results to the low-flow monitoring results. Evaluate and describe the observed differences in TA concentrations for the two distinct flow conditions.*
2. *Compare the upper Animas River data collected during this investigation to historical data published by others (e.g., USGS, Animas River Stake Holder Group [ARSG], and EPA). This comparison will evaluate if historical data, and the conclusions published regarding historical data, are representative of current conditions. This comparison will also evaluate historical concentration trends both temporally and spatially within the study area. The spatial analysis of the surface water quality along the reach of interest in the study area will evaluate how concentrations change in relation to known inflows.*
3. *Compare metals contamination in soil, mine waste, and tailings in the study area to water quality and sediment data in the Animas River to evaluate the contribution, if any, from suspected source areas on both the right and left bank of the Animas River.*

4. Use depth-to-water data to determine groundwater flow direction(s) and hydraulic gradient(s) within the study area. Evaluation of these data, in conjunction with geophysical data, will help support the interpretation of how surface water and groundwater interact.
5. Evaluate the concentrations of TAs in groundwater and their spatial distribution. Develop isoconcentration contour maps for selected dissolved phase chemicals of concern, if appropriate. Evaluation of these data will help support the interpretation of how surface water and groundwater interact.
6. Compare surface water and groundwater results. Evaluation of these data will support the interpretation of surface water and groundwater interaction.
7. Use geophysical investigation results from the proposed subsurface investigation (Formation Environmental, 2015a) to evaluate preferential groundwater flow pathways in the alluvial aquifer underlying the Mayflower Mill and Tailings Impoundment Area. Evaluation of these data will help support the interpretation of how surface water and groundwater interact.

*Measurement errors (field and laboratory) and related uncertainties for the data collected and the results of the data-analyses described above will be evaluated and described. The uncertainties associated with field and laboratory measurements obtained for this investigation will be identified through a review of data quality indicators, such as precision and accuracy. Measurement uncertainties will be documented and described in accordance with the data-quality review and validation procedures specified in Section 4.0 of the QAPP.*

*There are no plans to use the measurement data obtained through this investigation as the sole basis for risk-based (or other) decision making, and therefore, this plan does not specify the uncertainty level considered acceptable for statistically based decision making. In short, statistical evaluation of the data is not within the scope of the current investigation and is not currently planned.”*

**Response 2:** The following excerpted text was added to Section 4.1.1 of the Work Plan in response to this comment:

*“At this time no left bank inflows are included in Table 4-4, however, sample collection of left bank inflows will be considered based on access, location, field observations, and available historical water quality data or lack thereof.”*

11. **Section 3.5, second to last sentence** - The sediment results to date (and PW to a lesser degree) are relatively consistent in trend but highly variable in magnitude. GW trends are, to our knowledge, largely unknown. Please describe the logic that will be applied to determine whether the various media described in this media will be sampled "one or more times".

**Response:** The following excerpted text was added to /revised in Section 3.5 of the Work Plan in response to this comment:

*"Selected groundwater monitoring wells will be sampled at least once during the 2015 investigation. In 2015, sediment and sediment pore water will be sampled at least once in the upper Animas River. Various solid phase media (e.g., soil, tailings, mine waste, mineralized rock, etc.) will be sampled at selected locations in the study area. As previously discussed, additional multi-media sampling events are planned for 2016 and beyond to evaluate time-series trends (seasonal and spatial) in the various media and these investigation activities will be conducted under a separate work plan(s)."*

- 12. Section 4.1.1, second paragraph** - Why are water quality parameters not being measured?

**Response:** Please refer to the response to Comment #6.

- 13. Page 4-1, Section 4.1.1 and Figure 4-1.** The surface water sampling locations are presented. Figure 4-1 shows that limited data will be collected upstream of the impoundments area. Additional upstream samples should be considered if not available from other work in the area. These samples will provide useful background data for comparisons.

**Response:** Sample locations 4166 and 4023 serve as background (upstream) sample locations. Additional upstream sample data from EPA sampling events in 2015 will be considered, as needed.

- 14. Section 4.1.2, second paragraph** - Section 3.1 (Problem Statement) and 3.2 (Study Goals) make no mention of determining risk to aquatic life and in fact state explicitly that the PW is to support Nature and Extent investigation. EPA believes that PW measure can support this objective.

If however, the goal is to assess risk, explicitly include that as a study goal and provide the supporting information on how risk to aquatic life will be evaluated, what benchmarks will be used for comparison, how comparisons will be made and demonstrate that detection limits are adequate to achieve this goal for both surface water and sediment.

Additionally, tables 4-1 and 4-2 indicate that water quality parameters will not be collected for PW, GW or SW. These parameter are critical to determining potential risk, likely very useful to assessing GW/SW interactions and necessary in sampling of GW (as indicated in your SOP).

**Response:** This work plan describes the sampling and analysis plan for initial characterization of the study area; therefore, risk is not being considered at this time.

- 15. Section 4.1.3** – Water quality parameters are apparently not being measured which is inconsistent with the attached SOP. How will samplers determine if the well is purged sufficiently to collect a sample without measuring some water quality parameter? Please make the table and SOP and the SAP in general consistent.

**Response:** Please refer to the response to Comment #6.

- 16. Section 4.1.3** - It is not clear in this SAP or the subsurface investigation SAP what logic or criteria will be used to determine the location of the GW wells and therefore, the adequacy of the investigative approach virtually impossible to determine.

**Response:** The following excerpted text was added to /revised in Section 4.1.3 of the Work Plan in response to this comment:

*"Groundwater samples will be collected from all monitoring wells installed during the well installation program described in the Subsurface Investigation Work Plan (Formation Environmental, 2015a). It is planned for eight boreholes to be completed as monitoring wells; however, this number is likely to change according to field conditions. At least one monitoring well will be completed on each of the four tailings impoundments. As described in the Subsurface Investigation Work Plan, the target zone for well completion is the saturated native materials underlying each tailings impoundment for the characterization of water quality and piezometric heads. It is assumed that the tailings materials, which were generated by flotation milling methods, are generally fined grained and therefore have a low permeability. However, permeable saturated zones in the tailings, if encountered, will be noted and may further investigated with the installation of monitoring wells in 2016, as needed. Selected existing piezometers located on the upgradient edge of the tailings impoundments will be sampled to evaluate background (upgradient) groundwater quality conditions. The selection of these wells will be made based on observations in the field with regards to well condition, depth to water, and location."*

- 17. Page 4-2, Section 4.2.2, editorial.** It is noted that the Media type for the example sample identification in the groundwater section is "SW" instead of "GW". It should also be noted that the page numbering for section 4.0 is messed up – there are two of the following pages in the 4-1, 4-2 and 4-3. This should be corrected in section 4 of the document as well as in the TOC.

**Response:** The noted editorial revisions have been made.

- 18. Section 5.0** – Please indicate whether the data will also be made available electronically and in what form.

**Response:** *The following excerpted text was added /revised in Section 5.0 of the work plan in response to this comment:*

*“In addition, raw data in the form of electronic data deliverable spreadsheets generated by the subcontracted laboratory will be provided to EPA upon request.”*

Comments on the QAPP are as follows:

- 19.** Sunnyside included a Quality Assurance Project Plan/Sampling and Analysis Plan (QAPP) as an appendix to for the work described in each work plan but did not submit a Crosswalk for either QAPP. EPA requires the preparer of the QAPP to submit a Crosswalk to aid in its review of a QAPP. Since Sunnyside did not submit a Crosswalk, EPA as part of review has completed the Crosswalk and provided its comments concerning the QAPP the Crosswalk. It is requested that Sunnyside provided an explanation for how it addressed each deficient item noted in the Crosswalk including the comments in the “Summary of Comments” and re-submit the Crosswalk when it resubmits the revised work plan including the QAPP. The “Response” date and “Resolved” date should be included in the Comments section of the Crosswalk.

**Response:** *Please refer to the submitted Crosswalk table, which includes resolutions to the various issues identified by EPA reviewers.*

- 20.** A major concern with the QAPP was the lack of a clear understanding of the criteria or action levels for metals referred to in the plan (and used as a basis for analytical method detection limits). In the QAPP table of contents, Table A-3-2 (Achievable Laboratory Limits and Screening Criteria – Aqueous Samples) and Table A-3-3 (Achievable Laboratory Limits and Screening Criteria – Solid Phase Samples) do not contain screening criteria information. Only Laboratory Method Detection Limits and Laboratory Reporting Limits are provided.

Also in the Work Plan, Table 4-4 lists CDPHE water quality standards for only 3 metals – zinc, cadmium, and manganese. These numbers are footnoted (because they apparently are not table standard values but are derived from a list of criteria) that the numbers are the lowest from a group found in Table 5-2. However, this table does not exist in the work plan.

**Response:** *Please refer to the response to Comment #14.*

**21.** Significant concerns with the QAPP include the following items:

- All SOPs including Laboratory, Sampling Disposal (SOP3) and the Laboratory QMP need to be included as appendices to the QAPP.
- A timeline of activities should be provided.
- Information on indirect measurements should be included.
- Signature lines for EPA's approval (if we enter into an AOC) as well as Sunnyside approval, distribution list, DCN (document control number) and Revision number were also missing.

**Response:** Please refer to the submitted Crosswalk table, which includes resolutions to the various issues identified by EPA reviewers.